

the other of said two friction disks being non-rotatively connected to the other of the two parts, said one of said two friction disks having a single cross-section, said one of said two friction disks having a surface, said surface being hardened,

a disk spring [to bias], said disk spring biasing said one of said two friction disks in one engagement condition in respect to said other of said friction disks, [said spring] a piston, said piston being in direct contact with [said] one of said two friction disks,

and engagement means to [engage said one with said other of] move said piston against the bias of said disk spring so as to place said two friction disks [so as to connect the two parts] in another differing engagement condition.

Claim 2. The selectively engageable friction mechanism of claim 1 characterized by the addition of attachment means to non-rotatively connect said one or said other part to the housing such that said engagement means functions as a brake for said other or said one part respectively.

Claim 3. The selectively engageable friction mechanism of claim 1 characterized in that both of the two

parts are rotatively connected to the housing such that said engagement means functions as a clutch between the two parts.

Claim 4. The selectively engageable friction mechanism of claim 1 wherein the mechanism includes a planetary device having a sun gear, planet gears with a carrier and a ring gear characterized in that a part of the two parts coincides with a gear or carrier of the planetary device.

Claim 5. The mechanism of claim 4 characterized in that said one and said other of the two parts coincides with a gear or carrier of the planetary device.

Claim 6. The mechanism of claim 1 characterized in that there are five or more friction disks.

Claim 7 (amended once). The mechanism of claim 1 characterized in that said surface has a thickness and is hard anodized and 35-65% of said thickness of said hard anodizing is saturated within said surface.

Claim 8. The mechanism of claim 1 characterized in that said surface is coated by a complex oxide ceramic.

Claim 9 (second amendment). A selectively engageable friction mechanism comprising two parts and a housing, one of which is rotatable in respect to the other and the housing,

at least two friction disks, one of said two friction disks being non-rotatively connected to one of the two parts, the other of said two friction disks being non-rotatively connected to the other of the two parts, said one of said two friction disks having a single cross-section, said one of said two friction disks having a surface,

said surface being hardened [and], engagement means to engage said one with said other of said two friction disks so as to connect the two parts,

said engagement means includes a piston, said piston being located in a cavity, said cavity being located in the housing adjacent to said friction disks,

said piston being in direct physical contact with said one of said two friction disks,

said piston [having] being moveable between actuated and non-actuated positions relative to said friction disks;

a bias assembly, said bias assembly engaging [both] said piston and said housing and including a single disk spring, said single disk spring being in physical contact with both said housing and said piston,

said bias assembly biasing said piston into [either] one of said said actuated or non-actuated positions; and
a pressurization means, said pressurization means moving said piston into the other of said actuated or non-actuated positions.

Claim 10. A mechanism of claim 9 characterized in that said spring has an inner edge and an outer edge, said inner edge contacting either of said piston or said housing, and said outer edge contacting the other of said piston or said housing.

Claim 11. A mechanism of claim 10 characterized in that the spring is a belleville spring.

Claim 12. A mechanism of claim 9 characterized in that at least one washer is located intermediate between said spring and said housing.

Claim 13. A mechanism of claim 9 characterized in that said actuated position is synonymous with the brake being engaged.

Claim 14. A mechanism of claim 9 characterized in that said actuated position is synonymous with the brake being disengaged.

Claim 15. A mechanism of claim 7 characterized in that said surface is composed of an anodized metal, such metal preferably being aluminum.

Claim 16 (second amendment). A selectively engageable friction mechanism comprising a shaft and a housing, said shaft being selectably rotatable in respect to said housing;

a multiplicity of friction disks, said friction disks being non-rotatably connected to said shaft, said friction disks having an engagement surface, said engagement surface having a single cross section;

a multiplicity of reaction disks, said reaction disks being non-rotatably connected to said housing, said friction disks being interleaved with said reaction disks;

a piston, said piston being located in a cavity, said cavity being located in said housing adjacent to and in direct physical contact with one of said friction or said reaction disks, said piston having actuated and non-actuated positions relative to said one of said disks;

a bias assembly, said bias assembly engaging both said piston and said housing and including a single disk spring, said single disk spring being in physical contact with both said housing and said piston,

said disk spring of said bias assembly biasing said piston into either of said actuated or non-actuated positions; and

a pressurization means, said pressurization means moving said piston into the other of said actuated or non-actuated positions.

Claim 17. A mechanism of claim 16 characterized in that said spring has an inner edge and an outer edge, said inner edge contacting either of said piston or said housing, and said outer edge contacting the other of said piston or said housing.

Claim 18. A mechanism of claim 17 characterized in that the spring is a belleville spring.

Claim 19. A mechanism of claim 16 characterized in that at least one washer is located intermediate between said spring and said housing.

Claim 20. A mechanism of claim 16 characterized in that said actuated position is synonymous with the brake being engaged.

Claim 21. A mechanism of claim 16 characterized in that said actuated position is synonymous with the brake being disengaged.

Claim 22. A mechanism of claim 16 characterized in that said friction disks are composed of an anodized metal, such metal preferably being aluminum.

Claim 23. A mechanism of claim 22 characterized in that said friction disks are covered with Keronite.

Claim 24. A mechanism of claim 16 characterized in that said shaft is interconnected to a drive mechanism.

Claim 25 (second amendment). A selectively engageable friction mechanism comprising a shaft and a housing, said shaft being selectably rotatable in respect to said housing;

a multiplicity of friction disks, said friction disks being non-rotatably connected to said shaft, said friction

disks being composed of an anodized metal and having an engagement surface, said engagement surface having a single cross section;

a multiplicity of reaction disks, said reaction disks being non-rotatably connected to said housing, and said friction disks being interleaved with said reaction disks;

a piston, said piston being located in a cavity, said cavity being located in said housing adjacent to and in direct physical contact with one of said friction or said reaction disks, said piston having actuated and non-actuated positions relative to said one of said disks;

at least two seals, said seals being located in said piston and contacting said housing so as to provide at least one pressurizable chamber within said cavity;

a means of selectably pressurizing said at least one chamber said means allowing movement of said piston into either of said actuated or non-actuated positions;

a bias assembly, said bias assembly engaging both said piston and said housing and including a single disk spring; said single disk spring being in physical contact with both said housing and said piston,

said disk spring having an inner edge and an outer edge, said inner edge being radially displaced from said outer edge, said inner edge of said piston physically contacting

either of said piston or said housing, and said outer edge of said spring physically contacting the other of said piston or said housing; and

said bias assembly biasing said piston into the other of said actuated or non-actuated positions.

Claim 26. A mechanism of claim 25 characterized in that at least one washer is located intermediate between said spring and said housing.

Claim 27. A mechanism of claim 25 characterized in that said actuated position is synonymous with the brake being engaged.

Claim 28. A mechanism of claim 25 characterized in that said actuated position is synonymous with the brake being disengaged.

Claim 29. A mechanism of claim 25 characterized in that said friction disks are preferably aluminum.

Claim 30. A mechanism of claim 25 characterized in that said friction disks are covered with Keronite.

Claim 31. A mechanism of claim 25 characterized in that said shaft is interconnected to a drive mechanism.

Claim 32 (second amendment). A selectively engageable friction mechanism comprising a shaft and a housing, said shaft being selectably rotatable in respect to said housing;

a multiplicity of friction disks, said friction disks being non-rotatably connected to said shaft, said friction disks being composed of an anodized metal and having an engagement surface, said engagement surface having a single cross section;

a multiplicity of reaction disks, said reaction disks being non-rotatably connected to said housing, there being an equal number of said friction disks and said reaction disks, said friction disks being interleaved with said reaction disks;

a piston, said piston being located in a cavity, said cavity being located in said housing adjacent to said reaction disks in direct physical contact therewith, said piston having actuated and non-actuated positions relative to said reaction disks;

three seals, said seals being located in said piston and contacting said housing so as to provide two pressurizable chambers within said cavity;

a means of selectably pressurizing at least one of said chambers, the pressurization of either of said chambers allowing movement of said piston into either of said actuated or non-actuated positions;

a bias assembly, said bias assembly engaging both said piston and said housing and including a single disk spring; said single disk spring being in physical contact with both said housing and said piston,

said disk spring having an inner edge and an outer edge, said inner edge being radially displaced from said outer edge, said inner edge physically contacting either of said piston or said housing, and said outer edge physically contacting the other of said piston or said housing; and

at least one washer, said washer being located between said spring and said housing.

Claim 33. In a selectably engageable mechanism having a shaft and a bearing, there being a movable part surrounding the shaft, the improvement means for the movable part to contact the bearing to provide a bearing stop.

Claim 34 (amended once). In a selectively engageable mechanism having a shaft with a bearing, the bearing having an

CLAIMS

Claim 1. A selectively engageable friction mechanism comprising two parts and a housing, one of which two parts is rotatable in respect to the other and the housing,

at least two friction disks, one of said two friction disks being non-rotatively connected to one of the two parts, the other of said two friction disks being non-rotatively connected to the other of the two parts, said one of said two friction disks having a single cross-section, said one of said two friction disks having a surface, said surface being hardened,

a disk spring, said disk spring biasing said one of said two friction disks in one engagement condition in respect to said other of said friction disks, a piston, said piston being in direct contact with one of said two friction disks,

and engagement means to move said piston against the bias of said disk spring so as to place said two friction disks in another differing engagement condition.

Claim 2. The selectively engageable friction mechanism of claim 1 characterized by the addition of attachment means to non-rotatively connect said one or said other part to the housing such that said engagement means functions as a brake for said other or said one part respectively.

Claim 3. The selectively engageable friction mechanism of claim 1 characterized in that both of the two parts are rotatively connected to the housing such that said engagement means functions as a clutch between the two parts.

Claim 4. The selectively engageable friction mechanism of claim 1 wherein the mechanism includes a planetary device having a sun gear, planet gears with a carrier and a ring gear characterized in that a part of the two parts coincides with a gear or carrier of the planetary device.

Claim 5. The mechanism of claim 4 characterized in that said one and said other of the two parts coincides with a gear or carrier of the planetary device.

Claim 6. The mechanism of claim 1 characterized in that there are five or more friction disks.

Claim 7. The mechanism of claim 1 characterized in that said surface has a thickness and is hard anodized and 35-65% of said thickness of said hard anodizing is saturated within said surface.

Claim 8. The mechanism of claim 1 characterized in that said surface is coated by a complex oxide ceramic.

Claim 9. A selectively engageable friction mechanism comprising two parts and a housing, one of which is rotatable in respect to the other and the housing,

at least two friction disks, one of said two friction disks being non-rotatively connected to one of the two parts, the other of said two friction disks being non-rotatively connected to the other of the two parts, said one of said two friction disks having a single cross-section, said one of said two friction disks having a surface,

said surface being hardened, engagement means to engage said one with said other of said two friction disks so as to connect the two parts,

said engagement means includes a piston, said piston being located in a cavity, said cavity being located in the housing adjacent to said friction disks,

said piston being in direct physical contact with said one of said two friction disks,

said piston being moveable between actuated and non-actuated positions relative to said friction disks;

a bias assembly, said bias assembly engaging said piston and said housing and including a single disk spring,

said single disk spring being in physical contact with both said housing and said piston,

said bias assembly biasing said piston into one of said said actuated or non-actuated positions; and

a pressurization means, said pressurization means moving said piston into the other of said actuated or non-actuated positions.

Claim 10. A mechanism of claim 9 characterized in that said spring has an inner edge and an outer edge, said inner edge contacting either of said piston or said housing, and said outer edge contacting the other of said piston or said housing.

Claim 11. A mechanism of claim 10 characterized in that the spring is a belleville spring.

Claim 12. A mechanism of claim 9 characterized in that at least one washer is located intermediate between said spring and said housing.

Claim 13. A mechanism of claim 9 characterized in that said actuated position is synonymous with the brake being engaged.

Claim 14. A mechanism of claim 9 characterized in that said actuated position is synonymous with the brake being disengaged.

Claim 15. A mechanism of claim 7 characterized in that said surface is composed of an anodized metal, such metal preferably being aluminum.

Claim 16. A selectively engageable friction mechanism comprising a shaft and a housing, said shaft being selectably rotatable in respect to said housing;

a multiplicity of friction disks, said friction disks being non-rotatably connected to said shaft, said friction disks having an engagement surface, said engagement surface having a single cross section;

a multiplicity of reaction disks, said reaction disks being non-rotatably connected to said housing, said friction disks being interleaved with said reaction disks;

a piston, said piston being located in a cavity, said cavity being located in said housing adjacent to and in direct physical contact with one of said friction or said reaction disks, said piston having actuated and non-actuated positions relative to said one of said disks;

a bias assembly, said bias assembly engaging both said piston and said housing and including a single disk spring, said single disk spring being in physical contact with both said housing and said piston,

said disk spring of said bias assembly biasing said piston into either of said actuated or non-actuated positions; and

a pressurization means, said pressurization means moving said piston into the other of said actuated or non-actuated positions.

Claim 17. A mechanism of claim 16 characterized in that said spring has an inner edge and an outer edge, said inner edge contacting either of said piston or said housing, and said outer edge contacting the other of said piston or said housing.

Claim 18. A mechanism of claim 17 characterized in that the spring is a belleville spring.

Claim 19. A mechanism of claim 16 characterized in that at least one washer is located intermediate between said spring and said housing.

Claim 20. A mechanism of claim 16 characterized in that said actuated position is synonymous with the brake being engaged.

Claim 21. A mechanism of claim 16 characterized in that said actuated position is synonymous with the brake being disengaged.

Claim 22. A mechanism of claim 16 characterized in that said friction disks are composed of an anodized metal, such metal preferably being aluminum.

Claim 23. A mechanism of claim 22 characterized in that said friction disks are covered with Keronite.

Claim 24. A mechanism of claim 16 characterized in that said shaft is interconnected to a drive mechanism.

Claim 25. A selectively engageable friction mechanism comprising a shaft and a housing, said shaft being selectably rotatable in respect to said housing;

a multiplicity of friction disks, said friction disks being non-rotatably connected to said shaft, said friction disks being composed of an anodized metal and having an

engagement surface, said engagement surface having a single cross section;

a multiplicity of reaction disks, said reaction disks being non-rotatably connected to said housing, and said friction disks being interleaved with said reaction disks;

a piston, said piston being located in a cavity, said cavity being located in said housing adjacent to and in direct physical contact with one of said friction or said reaction disks, said piston having actuated and non-actuated positions relative to said one of said disks;

at least two seals, said seals being located in said piston and contacting said housing so as to provide at least one pressurizable chamber within said cavity;

a means of selectably pressurizing said at least one chamber said means allowing movement of said piston into either of said actuated or non-actuated positions;

a bias assembly, said bias assembly engaging both said piston and said housing and including a single disk spring; said single disk spring being in physical contact with both said housing and said piston,

said disk spring having an inner edge and an outer edge, said inner edge being radially displaced from said outer edge, said inner edge of said piston physically contacting either of said piston or said housing, and said outer edge of

said spring physically contacting the other of said piston or said housing; and

said bias assembly biasing said piston into the other of said actuated or non-actuated positions.

Claim 26. A mechanism of claim 25 characterized in that at least one washer is located intermediate between said spring and said housing.

Claim 27. A mechanism of claim 25 characterized in that said actuated position is synonymous with the brake being engaged.

Claim 28. A mechanism of claim 25 characterized in that said actuated position is synonymous with the brake being disengaged.

Claim 29. A mechanism of claim 25 characterized in that said friction disks are preferably aluminum.

Claim 30. A mechanism of claim 25 characterized in that said friction disks are covered with Keronite.

Claim 31. A mechanism of claim 25 characterized in that said shaft is interconnected to a drive mechanism.

Claim 32. A selectively engageable friction mechanism comprising a shaft and a housing, said shaft being selectably rotatable in respect to said housing;

a multiplicity of friction disks, said friction disks being non-rotatably connected to said shaft, said friction disks being composed of an anodized metal and having an engagement surface, said engagement surface having a single cross section;

a multiplicity of reaction disks, said reaction disks being non-rotatably connected to said housing, there being an equal number of said friction disks and said reaction disks, said friction disks being interleaved with said reaction disks;

a piston, said piston being located in a cavity, said cavity being located in said housing adjacent to said reaction disks in direct physical contact therewith, said piston having actuated and non-actuated positions relative to said reaction disks;

three seals, said seals being located in said piston and contacting said housing so as to provide two pressurizable chambers within said cavity;

a means of selectably pressurizing at least one of said chambers, the pressurization of either of said chambers allowing movement of said piston into either of said actuated or non-actuated positions;

a bias assembly, said bias assembly engaging both said piston and said housing and including a single disk spring; said single disk spring being in physical contact with both said housing and said piston,

said disk spring having an inner edge and an outer edge, said inner edge being radially displaced from said outer edge, said inner edge physically contacting either of said piston or said housing, and said outer edge physically contacting the other of said piston or said housing; and

at least one washer, said washer being located between said spring and said housing.

Claim 33. In a selectably engageable mechanism having a shaft and a bearing, there being a movable part surrounding the shaft, the improvement means for the movable part to contact the bearing to provide a bearing stop.

Claim 34. In a selectively engageable mechanism having a shaft with a bearing, the bearing having an inner

race, and the improvement of the inner race of the bearing being coextensive with the shaft.

Claim 35. In a selectively engageable mechanism between a shaft and another part, the improvement comprising a device.